Bundesanstalt für Materialforschung und -prüfung (BAM)

Certified Reference Material

BAM-U013c

Polycyclic aromatic hydrocarbons in soil

Certified Values

Measurand	Mass fraction [1] in mg/kg	Uncertainty [2] in mg/kg
Naphthalene	1.9	0.4
Acenaphthene	0.69	0.14
Fluorene	0.98	0.09
Phenanthrene	7.0	0.5
Anthracene	2.38	0.12
Fluoranthene	14.2	0.7
Pyrene	9.7	0.6
Benz[*a*]anthracene	9.6	0.6
Chrysene	10.6	0.6
Benzo[*b*]fluoranthene	11.3	1.2
Benzo[*k*]fluoranthene	4.7	0.3
Benzo[a]pyrene	8.1	0.8
Dibenz[*a,h*]anthracene	2.02	0.26
Benzo[*ghi*]perylene	5.5	0.4
Indeno[1,2,3-*cd*]pyrene	5.5	0.5
PAH sum[3]	94.2	4.0

[1] Unweighted mean value of 16 laboratory means.

[2] Estimated expanded uncertainty *U* with a coverage factor of *k* = 2, corresponding to a level of confidence of approx. 95 %, as defined in the Guide to the expression of uncertainty in measurement, (GUM, ISO/IEC Guide 98-3:2008).

[3] Sum of the 15 listed congeners

This certificate is valid for a period of 12 months starting with the dispatch of the reference material from BAM.

Material description

Reference material BAM-U013c is a moderately contaminated soil sampled from a former gasworks site in the city of Berlin, Germany. After drying, sieving and homogenisation, the fraction < 125 µm was subdivided into units of 73 g which were filled in amber glass bottles with screw caps equipped with PTFE-inserts and sealed with shrinking foil. The material is stored at BAM at -20 °C until dispatch. Details on the preparation and characterisation procedures are specified in the certification report.

Date of dispatch: Sample No.:

Acenaphthylene could not be quantified using liquid chromatography and optical detectors. Therefore, the mass fraction determined by GC-MS is given as informative value. For details see the certification report.

Values for information

Measurand	Mass fraction [1)] in mg/kg	Uncertainty in mg/kg
Acenaphthylene	0.65	0.24

Instructions for Use

BAM-U013c is explicitly meant only to be used in analytical laboratories. The intended purpose of reference material BAM-U013c is the verification of analytical procedures for the determination of PAH in soils and sediments.

The minimum sample size for one determination is 5 g. The mass fractions of the PAH are related to sample intake (not to dry mass). The water content is (3.0 ± 0.3) % and remains stable if the material is handled as indicated below. It is strongly recommended to handle and dispose of the reference material in accordance with the guidelines for analytical soil samples legally in force at the site of end use and disposal.

Transport and Storage

BAM-U013c can be shipped at ambient temperature. Upon receipt the material has to be stored at -20 °C in its original bottle. Before taking a subsample the bottle has to have reached ambient temperature. Thereafter, the bottle is to be closed tightly and stored at -20 °C. The stability of the reference material is not affected by short periods of handling at ambient temperature during transport and use.

Metrological Traceability

All certified values refer to the extractable amount of the PAH congeners and are conventional to this extent. It is known from experience that there is no significant bias among the applied methods and the completeness of extraction was demonstrated for many similar materials. In order to ensure traceability of the extractable content as defined above, certified calibration standards SRM 1647f or SRM 2260a, respectively, were employed by the participants.

Participating Laboratories

Analysen Service GmbH, Leipzig, Germany
AGROLAB Labor GmbH, Bruckberg, Germany
Bundesanstalt für Materialforschung und -prüfung, Berlin (BAM), Germany
CLG Chemisches Labor Dr. Graser KG, Schonungen, Germany
Departement für Wirtschaft, Soziales und Umwelt, Kanton Basel-Stadt, Basel, Switzerland
ERGO Umweltinstitut GmbH, Dresden, Germany
ICA-Institut für Chemische Analytik GmbH. Leipzig, Germany
ISEGA Umweltanalytik GmbH, Hanau, Germany
Nano GmbH, Weitnau, Germany
SYNLAB Umweltinstitut LAG GmbH, Spremberg, Germany
thyssenkrupp Steel Europe AG, Dortmund, Germany
WESSLING GmbH, Hannover, Germany

Three participants performed two or three independent measurement series, respectively.

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Technical Report

A detailed technical report describing the analytical procedures and the treatment of the analytical data used to certify BAM-U013c is available on request or can be downloaded from the BAM website (www.bam.de).

Accepted as BAM-CRM on 29.08.2018

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BAM holds an accreditation as a reference material producer according to ISO Guide 34 in combination with ISO/IEC 17025. This accreditation is valid only for the scope as specified in the certificate D-RM-11075-01-00. DAkkS is a signatory of the multilateral agreement (MLA) between EA, ILAC and IAF for mutual acceptance.

DAkkS Deutsche Akkreditierungsstelle D-RM-11075-01-00

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